1,169,621

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Suede-Like Materials Made in Imitation of Leather and a Method of Manufacturing Such Materials

We, YAMANASHI KASEI KOGYO CO., LTD., of 4315—18, Kofuchu-Machi, Kofu-Shi, Yamanashi-Ken, Japan; a Japanese company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to the production of materials made in imitation leather having the appearance of suede and which may be used for shoe uppers, handbags and other articles where suede may be used.

This invention is basically different from that shown in U.S. Patent No. 3,027,595, Canadian Patent No. 643,347, British Patent No. 889,783, British Patents Nos. 1,048,928 and 1,048,929. The invention shown in the above mentioned patents have as their object the forming of pile-like projections by means of a molding drum or a matrix, on a sheet of thermoplastic material, the projections in these cases are identical to or are nearly of the same height as the depressions in the molding drum or matrix. In this invention, the object is to form wavy hair-like filaments, which are much finer than the depressions in the mold, on a thermoplastic sheet which has a cloth backing.

Thus according to the present invention there is provided a suede-like material made in imitation of leather comprising a laminated structure consisting of a fabric backing web, and a web of thermoplastic material having one face firmly united to one face of said fabric web, the other face of said thermoplastic web comprising a multiplicity of non-uniform variably distorted hair-like filaments integral therewith.

According to a further aspect of the present invention such material made in imitation of leather is produced by a method which comprises the steps of

(a) taking a laminate comprising a sheet of thermoplastic material adhered to one face of a fabric backing web.

(b) providing a heated matrix having a high multiplicity of substantially conical depressions in its outer surface,

(c) continuously heating said sheet of thermoplastic material until the face remote from the web is in the fluid state,

(d) continuously pressing said fluid face into the depressions of the heated matrix,

(e) cooling the backing web to a temperature slightly above the softening point of the thermoplastic material,

(f) stripping the thermoplastic sheet from the matrix before it has set, and

(g) allowing the thermoplastic material to set.

Conveniently the mean thickness of the thermoplastic web is between 0.3 and 2 mm, and the length of the hair-like filaments varies from 0.75 to 6 mm. Some of the filaments may be hollow and some may have branched ends.

Desirably, and particularly in the case of polyvinyl chloride, the thermoplastic material is heated to a temperature from 160° to 180°C. and the matrix is heated to a temperature from 120° to 140°C.

The laminate may be cooled to a temperature of 50° to 70°C for stripping by means of a spray of water at a temperature of 5° to 10°C directed at the backing web.

[Price

Very conveniently the matrix is a drum and its surface is provided with from 120 to 2000 depressions per cm², the depressions being conical and 0.5 to 2.0 mm deep.

It will be noted that in the preferred manufacturing method after the thermoplastic film which forms the surface of the laminate is heated and is in a molten state and is pressed into the depressions in the molding drum surface, cold water is sprayed on to the back of the laminate which cools the film so that it hardens and sets and adheres firmly to the backing cloth. The thermoplastic material lightly bonded to the walls of the fine substantially conical depressions in the drum mold is withdrawn from the depressions when the temperature is lowered to a point a little above the softening point of the thermoplastic material. In stripping the laminate from the drum at this temperature, hair-like filaments emerge from the fine substantially conical depressions and densely cover the surface of the laminate. These hair-like filaments are of varied thickness when withdrawn from the said walls of the fine depressions during the stripping and, therefore, when the filaments solidify on cooling in the atmosphere, they tend to curl.

The material made in imitation of leather resulting from the above described manufacturing process has fine curled hair-like filaments densely covering the surface of the cloth-backed thermoplastic film, and is soft and warm to the touch in a manner similar to the feel of suede leather. This material made in imitation of leather can be used for the tops of shoes or as material for handbags, and for other purposes where suede leather may be used. The cloth backing permits easy handling when sewing or sticking the material. The cloth tends to give a firmness to the material and prevents creasing and wrinkling thereof.

In order that this invention may be best understood and appreciated reference is made to the following description of a preferred manner of carrying out the process taken with the accompanying drawings in which:—

Fig. 1 is a diagram of manufacturing equipment for producing the material of this invention;

Fig. 2 is a fragmentary vertical section of a portion of the molding drum;

Fig. 3 is a fragmentary plan view of a portion of the molding drum; and

Fig. 4 is an enlarged section through the material.

The thickness of the laminate used in the method of the invention is not critical.

The cloth backing should have a mesh size which will retain the thermoplastic film when in a molten state, furthermore the cloth should not char when heated to approximately 250°C., and should retain its physical strength.

The thermoplastic film material can be of various kinds, such as PVC (Polyvinyl chloride), Polyethylene, and Polyvinyl alcohol. The mean thickness of the film is preferably between 0.3 and 2mm. the most suitable thickness is from 0.5 to 1mm. The width of the thermoplastic film is determined by the effective length of the molding drum. The thermoplastic film which is received in roll form as a finished product, is heated to approximately 130°C. to 150°C. and is laminated with a suitable cloth by rolling between a roller heated to 130°C. to 150°C. and a pressure roller, and the plastic-cloth laminate is cooled and then coiled.

A preferred PVC film is composed of the following:

	Parts by Weight
PVC resin	80—120
Di-octyl Phthalate	60—100
Stabilizing agent	2— 3
Coloring	2— 3

The most suitable composition is as follows:

	Parts by Weight
PVC resin	100
Di-octyl phthalate	80
Stabilizing agent	2
Coloring	2

Apparatus suitable for performing the method of this invention is shown in Figs. 1, 2 and 3.

A laminate 20 of PVC film 11 on a cloth backing 10 is wound to form coil 21. The laminate 20 is unwound from coil 21 at a speed of 1 to 2 meters per minute passing under idler roller 40. Pre-heating roller 22 supports the cloth 10, while radiant heat from heater 23, which includes electric heaters 24 is directed onto film 11 to heat said film to 160—180°C. thus melting the film surface. The laminate is pressed between molding drum 26 which is heated by super-heated steam to 120—140°C. and rubber pressure roller 28 which has a Shore durometer hardness of 30—40. The melted thermoplastic film surface is firmly pressed against the molding drum 26. The melted film enters the fine depressions 27 formed in the surface of the molding drum by hammering fine needles into the surface and removing them. The depressions 27 thus formed have a depth from 0.5—2.0 mm. the diameter at the surface being 0.3—1 mm. the density of the depressions being 120 to 2000 depressions/cm². The most satisfactory material was obtained from the following: Depression depth 0.7—1.2 mm., depression

diameter at the surface 0.35—0.5 mm., depression density 400 to 1000 depressions/cm².

Guide roller 30 is located adjacent the periphery of the molding drum 26 at a point approximately 80° from the point where molding drum 26 is tangent to the pressure roller 28. The laminate adheres to the molding drum 26 till it passes guide roller 30, at this point the laminate is stripped from the molding drum 26. Cold water sprayed from perforated pipe 32 which is located below guide roller 30 serves to cool the back surface of the laminate. The temperature of the water is held at 5—10°C., and the volume of water is 5—10 litres per minute. The temperature of the film which is stripped from the molding drum 26 is arranged to be 50—70°C. The PVC which has entered the depressions is withdrawn at a temperature which is slightly above the softening temperature of the PVC which is 80—90°C. By the above described cooling process, the film solidifies, and adheres firmly to the cloth backing 10. Thus when the laminate is stripped from the molding drum 26 there is no problem of the film 11 parting from the cloth 10. The PVC which is pressed into the depressions 27 adheres to the walls of the depressions 27 and as the film is still plastic the portions in the depressions are elongated to form hair-like filaments 33 as they are withdrawn from the substantially conical depressions 27. The adherence of the plastic to the walls of the depressions 27 differs according to the local temperature of the molding drum as well as the local cooling of the laminate and also according to the shape and diameter of depressions 27. Thus when the plastic is withdrawn, the hair-like filaments will all differ in length, the length being from 1.5—3 times the depth of the substantially conical depressions 27. Also since the adherence of the plastic to the walls of the depressions 27 differs and furthermore since the PVC is non-homogeneous in composition, the plastic will be withdrawn in an uneven manner. This results in the curled finish on the filaments. Another factor causing further curl is the uneven stresses which develop in the material when the filaments cool in the atmosphere and shrink as they set.

The hair-like filaments 13 as shown in Fig. 4 are permanent. Some of the filaments are hollow inside, and some of the filaments are branched. The reason for these types of filaments being formed is still unknown at this time.

The finished laminate 34 is wound into coil 35 and is stored and transported in this form. The coil is unwound, and the laminate cut to convenient sizes as required to form the tops of shoes or the material for handbags, or for other uses where synthetic suede leather may be employed.

In Fig. 3, for the sake of clarity, some of the depressions 27 are indicated by crosses.

WHAT WE CLAIM IS:—

1. A suede-like material made in imitation of leather comprising a laminated structure consisting of a fabric backing web, and a web of thermoplastic material having one face firmly united to one face of said fabric web, the other face of said thermoplastic web comprising a multiplicity of non-uniform variably distorted hair-like filaments integral therewith.

2. A material according to claim 1, wherein the mean thickness of the thermoplastic web is between 0.3 and 2 mm, and the length of the hair-like filaments varies from 0.75 to 6 mm.

3. A material according to claim 1 or 2, wherein some of the filaments are hollow.

4. A material according to claim 1 or 2, wherein some of the filaments have branched ends.

5. A method of manufacturing a suede-like material made in imitation of leather according to claim 1 which comprises the steps of

(a) taking a laminate comprising a sheet of thermoplastic material adhered to one face of a fabric backing web,

(b) providing a heated matrix having a high multiplicity of substantially conical depressions in its outer surface,

(c) continuously heating said sheet of thermoplastic material until the face remote from the web is in a fluid state,

(d) continuously pressing said fluid face into the depressions of the heated matrix,

(e) cooling the backing web to a temperature slightly above the softening point of the thermoplastic material,

(f) stripping the thermoplastic sheet from the matrix before it has set, and

(g) allowing the thermoplastic material to set.

6. The method according to claim 5, wherein the thermoplastic material is heated to a temperature from 160° to 180°C and the matrix is heated to a temperature from 120° to 140°C.

7. The method according to claim 5 or 6, wherein the laminate is cooled to a temperature of from 50° to 70°C for stripping.

8. The method according to claim 5, 6 or 7, wherein the backing web is cooled by means of a water spray at a temperature of from 5° to 10°C.

9. The method according to any of claims 5 to 8, wherein the matrix is a drum and

its surface is provided with from 120 to 2,000 depressions per cm^2.

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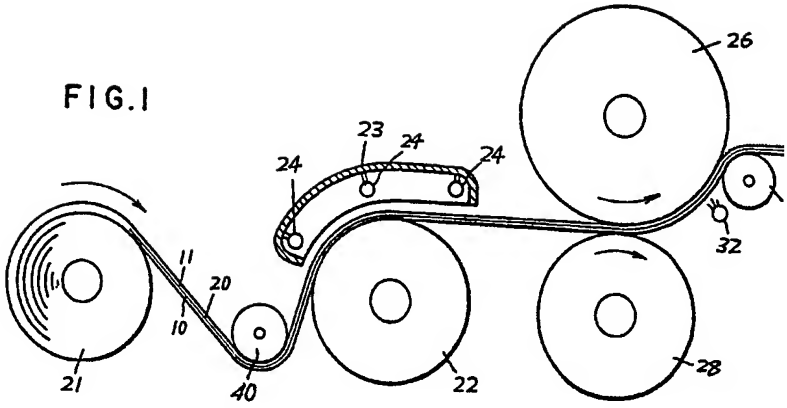
FIG.1



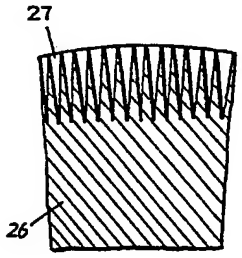


FIG.2

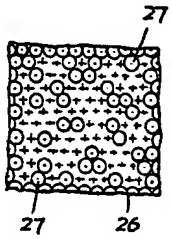


FIG.3

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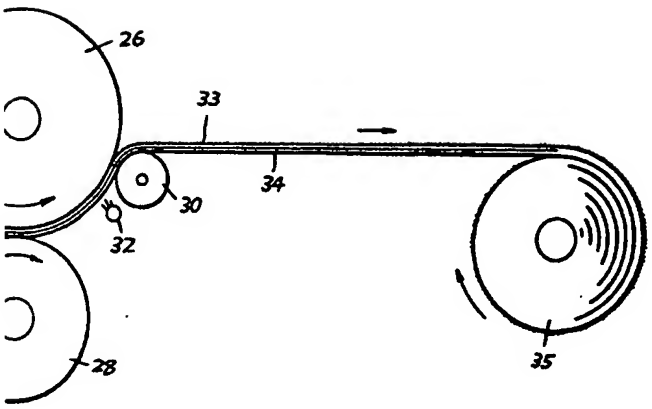
1 SHEET This drawing is a reproduction of the Original on a reduced scale



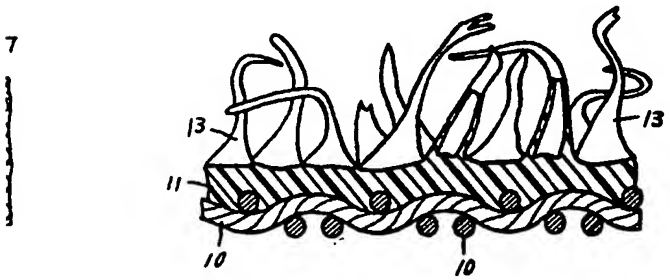


FIG.4

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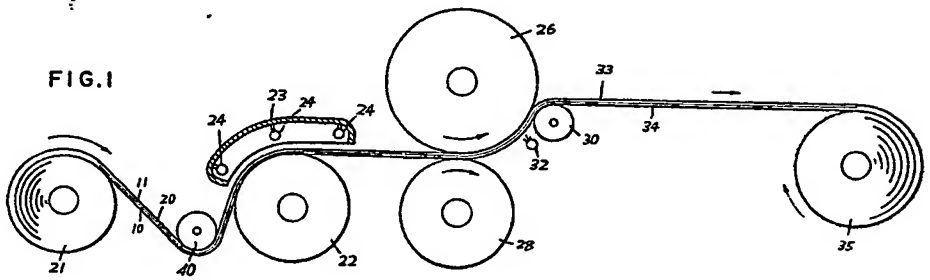
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG.1



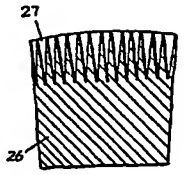


FIG.2

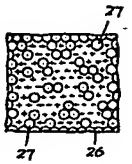


FIG.3

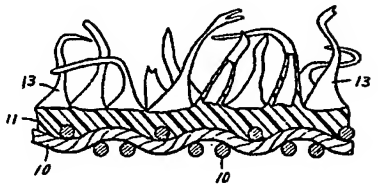


FIG.4